

Supporting Information

Corrosion Engineering towards High-Energy Mn doped Co_3O_4 Nanoflake Cathode for Rechargeable Zn-based Battery

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Experimental section

Synthesis of CO and MCO electrode. The Co foam (Kunshan Jiayisheng Electronics Co., LTD) was washed and sonicated in 1M HCl for 15 min to remove the oxide layer. Then, the washed Co foam was immersed in 10ml deionized water before dissolving 0.05 g $\text{Na}_2\text{S}_2\text{O}_3$ (Tianjin Reagent Chemicals Co., LTD.) and 0.14 g KMnO_4 (Guangzhou Chemical Reagent Factory.) was added in the above solution. After a 5 min reaction time, the Co foam was washed with the DI water until the water was pellucid. After an overnight drying process, the as-prepared Co foam was annealed in air at 350 °C for 1 h. The procedure for the synthesis of CO was similar to MCO without adding KMnO_4 .

Materials and electrochemical characterizations. The morphological structure of the CO and MCO samples were characterized using field-emission SEM (GeMini 500, ZEISS), TEM (Tecnai G2 F30, FEI), XRD (SmartLab, Rigaku). The XPS (NEXSA, ThermoFisher) and Raman (inVia, Renishaw) was measured to characterize the chemical structure of the SC and SMC. Electrochemical workstation (CHI 760) and Neware battery system (CT3008-5V10mA-164, Shenzhen, China) were used to collect CV, GCD and EIS measurements. The electrochemical performance of the SC and SMC were characterized to fabricate a two-electrode system (beaker cell) with Zn plate as anode and the 1 M KOH and 0.02 M $\text{Zn}(\text{CH}_3\text{COO})_2$ as the electrolyte. The electrode area is fixed as $0.5 \times 1 \text{ cm}^2$. For EIS measurement, the applied frequency is between 10^2 - 10^5 Hz.

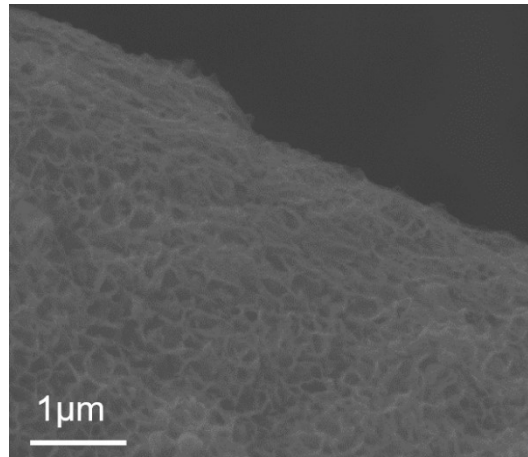


Fig. S1 SEM image of CO.

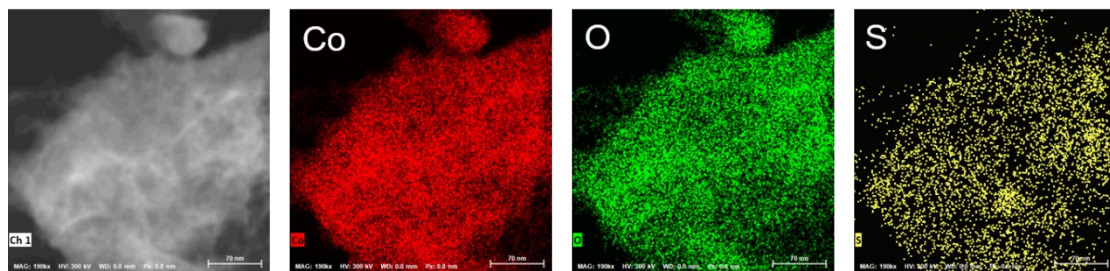


Fig. S2 EDS mapping images of CO.

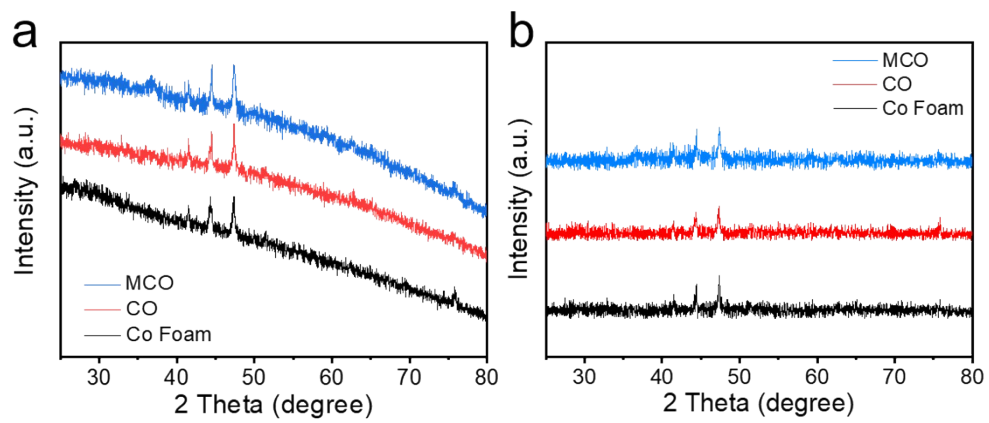


Fig. S3 (a) Original and (b) background deducted XRD patterns of MCO, CO and Co foam.

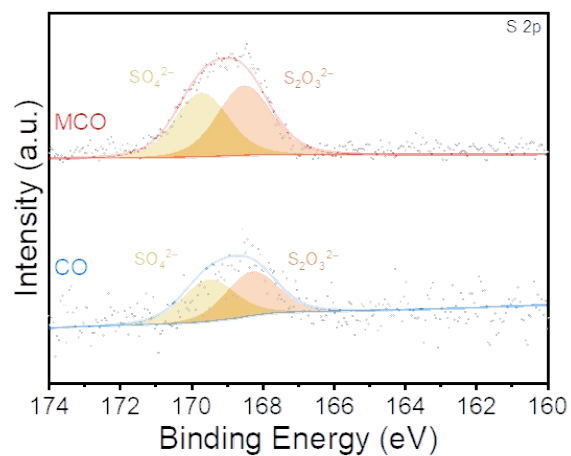


Fig. S4 S 2p XPS spectra of MCO and CO.

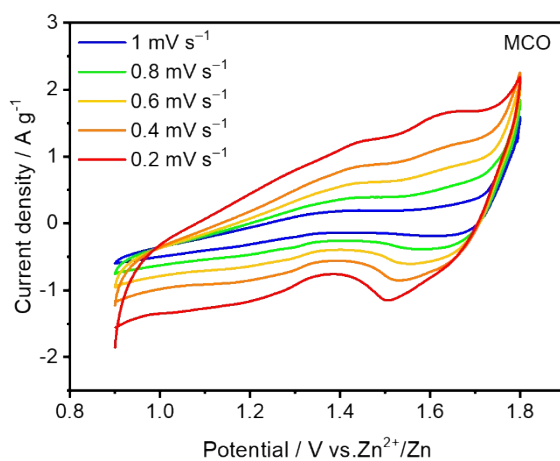


Fig. S5 CV curves of MCO.

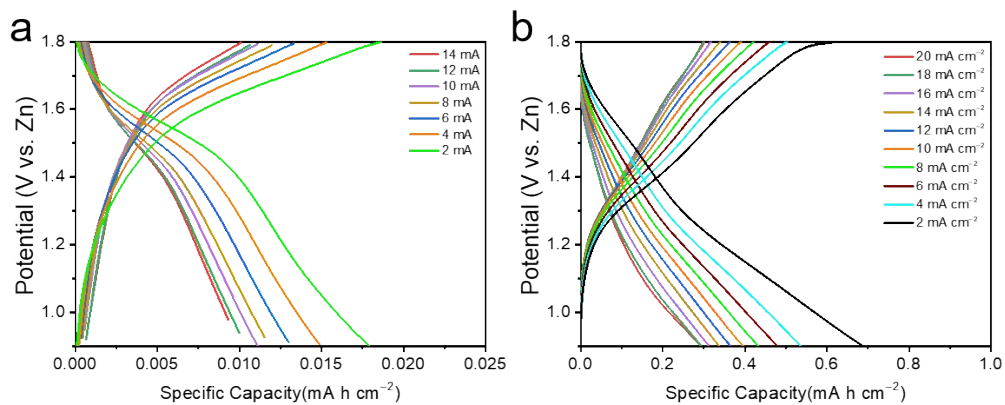


Fig. S6 GCD curves of (a) CO and (b) MCO.

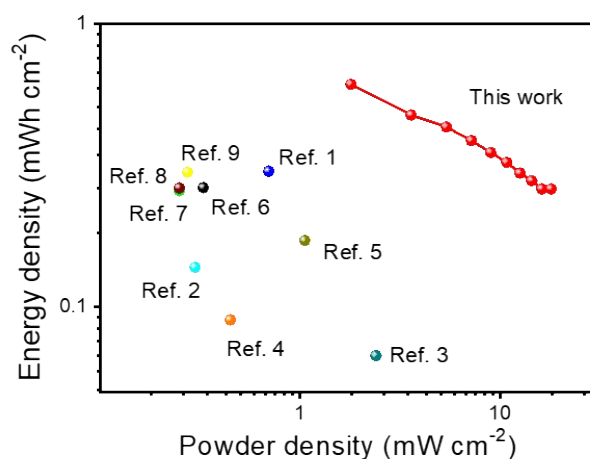


Fig.S7 Energy density comparison between MCO and reported cathode materials based on the area of cathode.

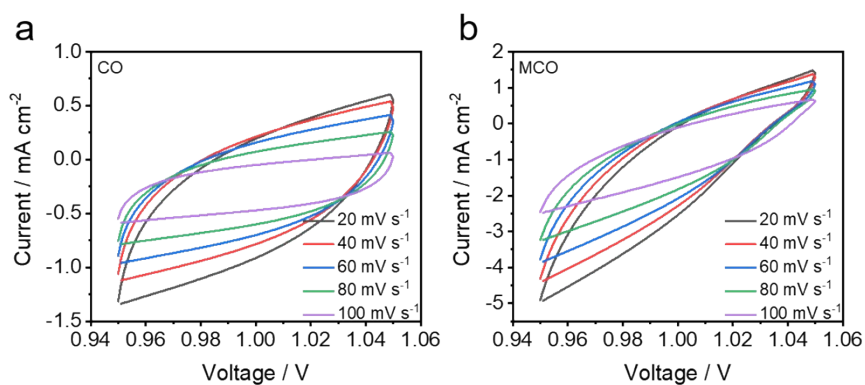


Fig.S8 CV curves of (a) CO and (b) MCO at voltage window of 0.95-1.05 V.

Table S1. Fitted EIS results for MCO and MO electrode

MCO		MO	
R_{ct} (Ω)	R_w (Ω)	R_{ct} (Ω)	R_w (Ω)
4.28	9.38	37.71	37.92

Reference

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